

Visualizing and Forecasting Stocks Using Machine Learning

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Abstract : Predicting stock prices in the market is a challenging task due to the absence of clear-cut rules, yet it offers the potential for high returns. Despite their inherent volatility, investors can analyze share prices and various statistical factors to make informed decisions on where to invest their earnings. A compelling project idea involves utilizing the Dash library in Python to create dynamic plots of financial data for a specific company, using tabular data provided by the yfinance Python library. Additionally, incorporating machine learning algorithms enhances the project by enabling the prediction of future stock prices. This project serves as an excellent introduction for Python and data science beginners, while also providing a valuable refresher for professionals with prior experience in Python and machine learning.

Keywords – Stock Market, Machine Learning, Python, yfinance, Predictions

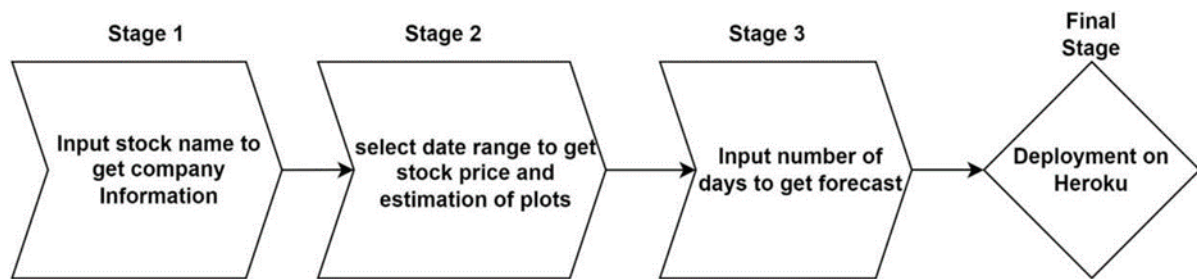
1. Introduction:

Investment firms and individual investors increasingly leverage sophisticated financial models to gain deeper insights into the market and optimize their investment strategies. With an abundance of data on stock price fluctuations readily available for analysis, investors make informed decisions by scrutinizing news, delving into corporate histories, analyzing trade trends, and considering various variables to formulate predictions. Despite the prevailing belief that stock prices are inherently random and unpredictable, renowned companies such as Morgan Stanley and Citigroup employ quantitative analysts to construct predictive models.

This paper aims to employ advanced Deep Learning techniques, specifically Long Short-Term Memory (LSTM) Neural Networks, to forecast stock prices. While Recurrent Neural Networks (RNNs) have traditionally been instrumental for time-series data, recent research underscores LSTM networks as the most sought-after and effective variants within the realm of RNNs. Acknowledging that businesses can be susceptible to market fluctuations beyond their control—such as market sentiment, economic conditions, or sector-specific developments—underscores the importance of deploying sophisticated predictive models to navigate these complexities.

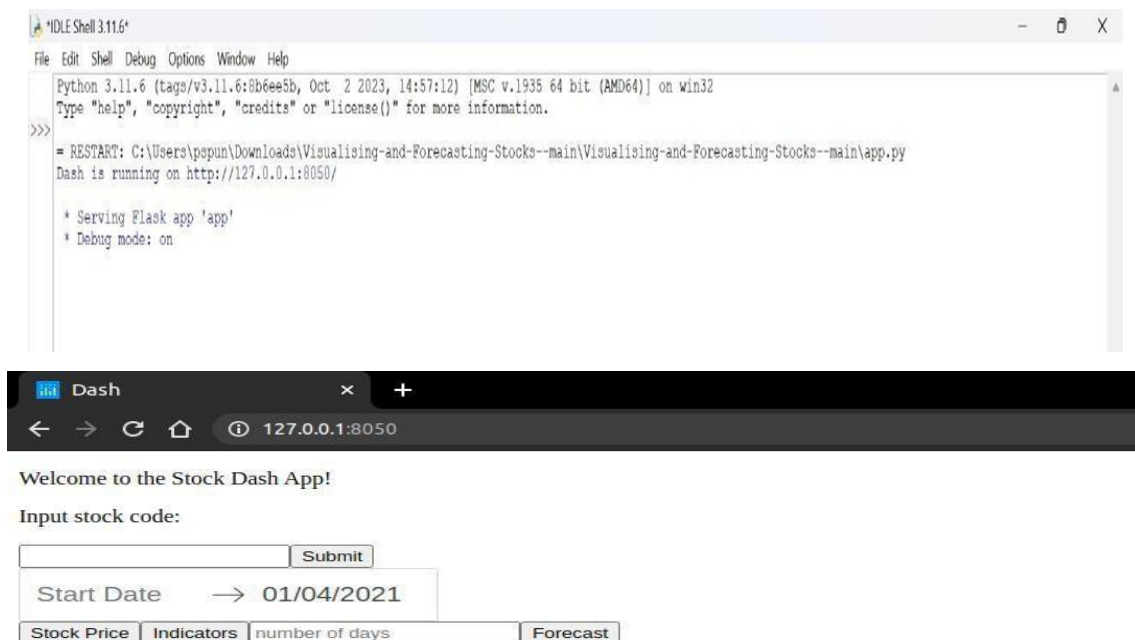
2. Proposed Work Plan:

Our project represents a cutting-edge single-page web application seamlessly blending Dash, a Python framework, with powerful machine learning models. The primary objective is to provide users with precise predictions of future stock closing prices over a specified time horizon. Leveraging the dynamic capabilities of Dash's HTML and core components, we've meticulously crafted the web structure. Elevating the user experience, our UI is enriched through the artful application of CSS styling. Plotly, a Python graphing library, dynamically generates insightful data visualizations, while yfinance serves as the conduit for fetching real-time market data. At the heart of our application lies advanced machine learning models, tirelessly working to forecast stock prices for user-specified dates. The culmination of this endeavor is a live deployment on Heroku, ensuring seamless accessibility to our innovative financial forecasting tool.

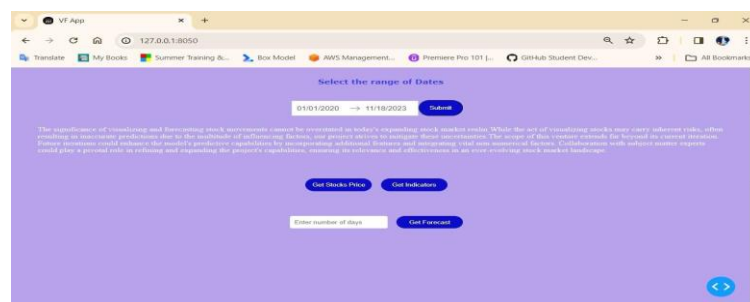


3. Experimental Result Analysis:

- A. Expected Outcome: By now you should have the basic web page setup as shown below in the second image which can be seen by starting the server locally as shown below in the first image.



- B. Style Your Application: At this stage, your webpage should have a much better look than before. You may use the web page below as your starter template.



- C. Generating a Company's Information and Graphs: We are going to use the yfinance python library to get company information (name, logo and description) and stock price history. Dash's callback functions will be used to trigger updates based on change in inputs.

D. Creating the Machine Learning Model: After finishing all this, we should have a complete project where user input - stock, code can give us the company information and relevant plots. Also, user input number of days can give us a forecast plot.



E. Deploying the project on Heroku: Finally, our web app is deployed and can be accessed by anyone in the world.

4. Conclusion:

The allure of stock market trading has surged in popularity, prompting researchers to explore innovative techniques for precision in stock price prediction. In this project, we harnessed the power of deep learning models, specifically leveraging Long Short-Term Memory (LSTM) and Recurrent Neural Network (RNN) units. This

strategic approach aims to provide investors and individuals with accurate insights into the dynamic landscape of the stock market, enabling informed decision-making.

The significance of visualizing and forecasting stock movements cannot be overstated in today's expanding stock market realm. Recent reports indicate a consistent rise in the number of investors entering the market annually, underscoring the pressing need for a robust system that can guide them through the intricacies of stock investments. While the act of visualizing stocks may carry inherent risks, often resulting in inaccurate predictions due to the multitude of influencing factors, our project strives to mitigate these uncertainties.

The scope of this venture extends far beyond its current iteration. Future iterations could enhance the model's predictive capabilities by incorporating additional features and integrating vital non-numerical factors. Collaboration with subject matter experts could play a pivotal role in refining and expanding the project's capabilities, ensuring its relevance and effectiveness in an ever-evolving stock market landscape.

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